United States Patent [19]

Iue-Tzung et al.

[11] **Patent Number: 4,847,922**

[45] **Date of Patent: Jul. 18, 1989**

[54] **COMBINED TOILET SEAT AND REELABLE SEAT COVER**

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[21] Appl. No.: **171,852**

[22] Filed: **Mar. 22, 1988**

[51] **Int. Cl.**[4] **A47K 13/22;** A47K 13/14

[52] **U.S. Cl.** **4/247;** 4/242

[58] **Field of Search** 4/234, 237, 242, 243, 4/244, 245, 246, 247, 251, 240; 242/55.2, 55.3, 55.42, 76

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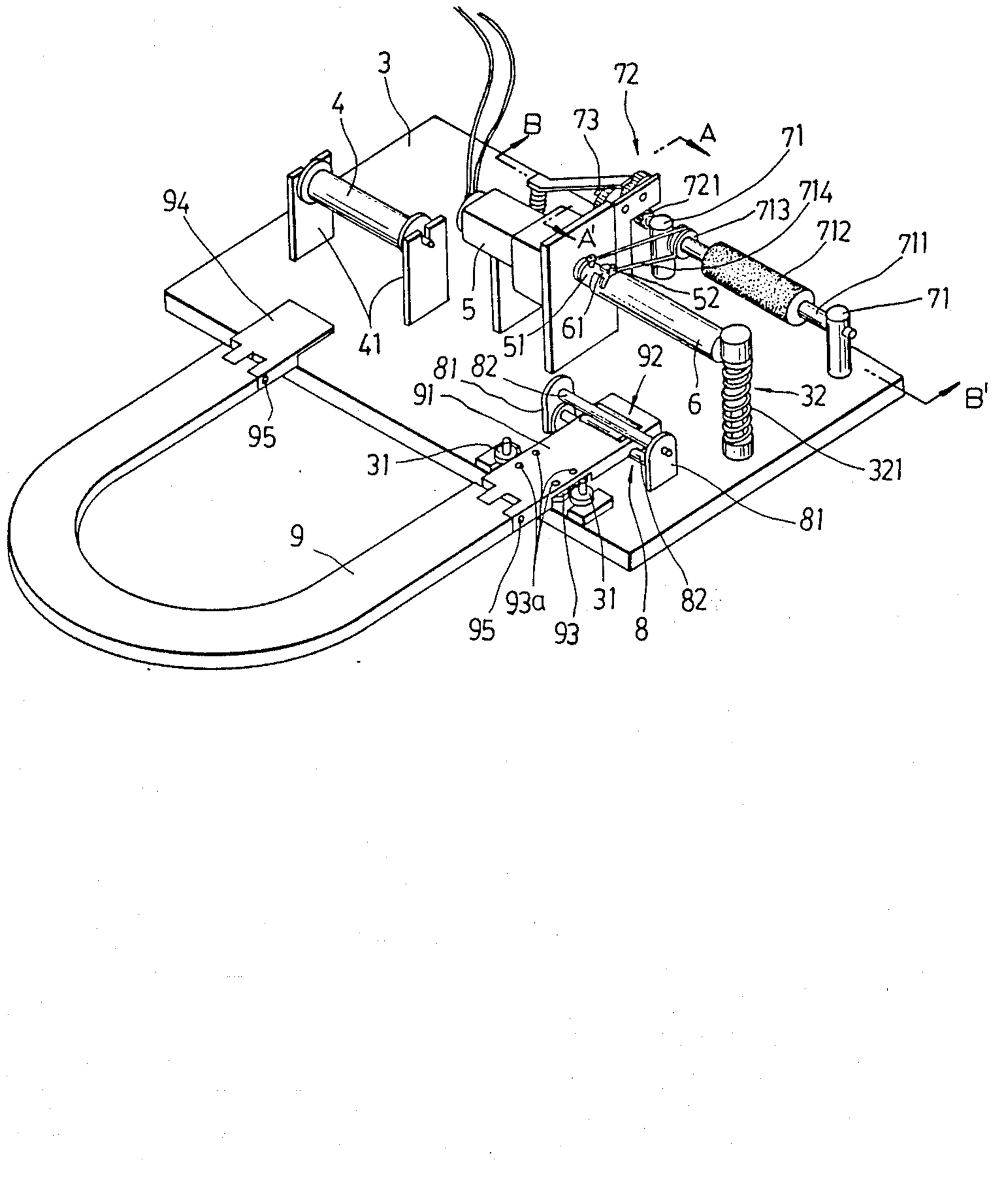
Assistant Examiner—Glenn T. Barrett
Attorney, Agent, or Firm—Ladas & Parry

[57] **ABSTRACT**

A combined toilet seat and reelable seat covering device includes a U-shaped seat plate and a flexible lay-flat tube cover adapted to be sleeved on the seat plate. One end of the seat is mounted on a mounting plate and rollers are provided for clamping and positioning the end of the seat. The used length of the tube sheet can be removed from the seat plate by passing between the rollers. A motor which operates a wind-up roller is controlled by a friction roller over which the tensed tube cover passes upstream of the wind-up roller and a speed reducing gear assembly which is associated with the friction roller. The speed reducing seat assembly incorporates a spring plate to de-energize a switch of the motor when a predetermined length of the tube cover is removed from the seat and wound on the wind-up roller.

12 Claims, 4 Drawing Sheets



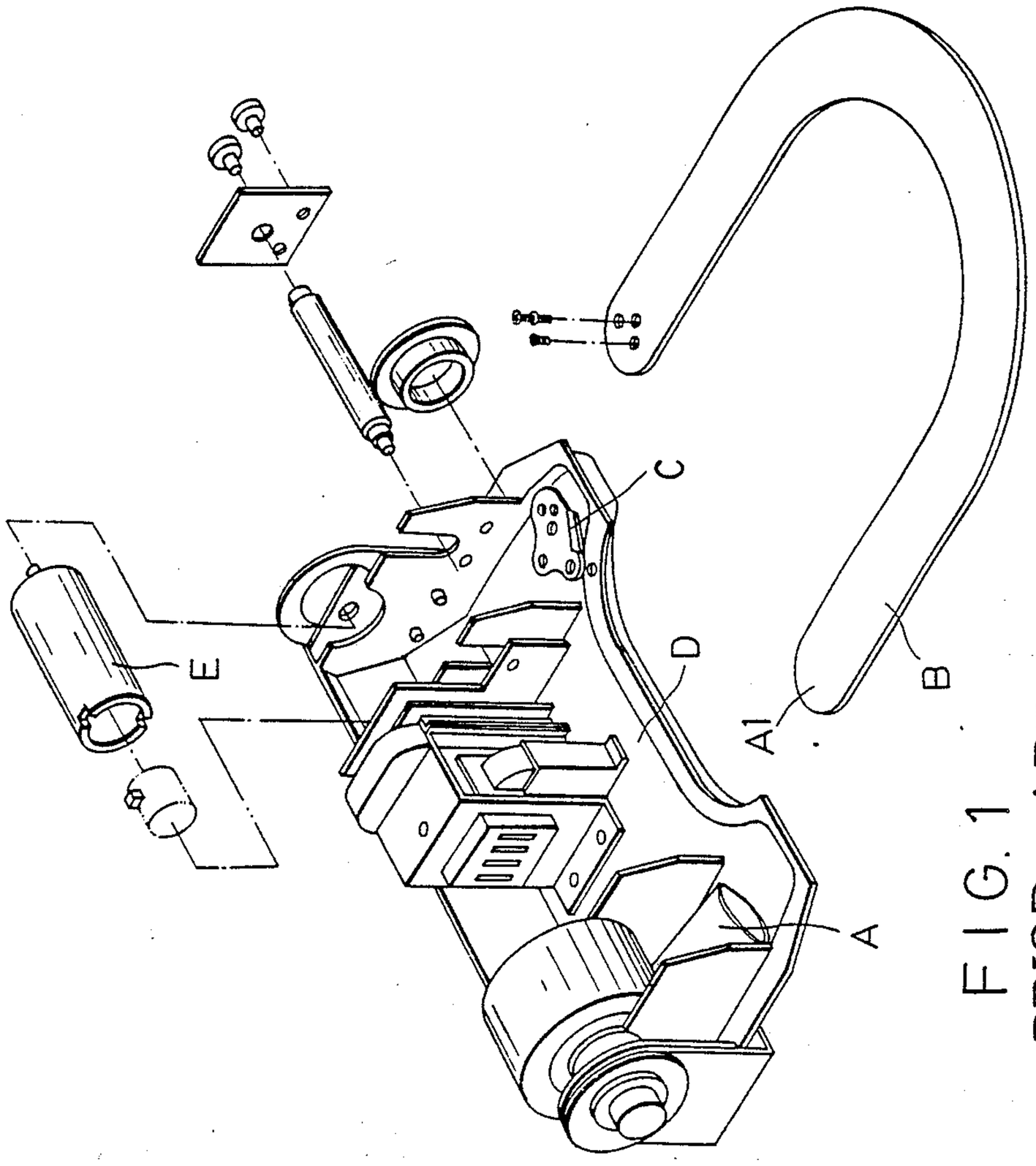
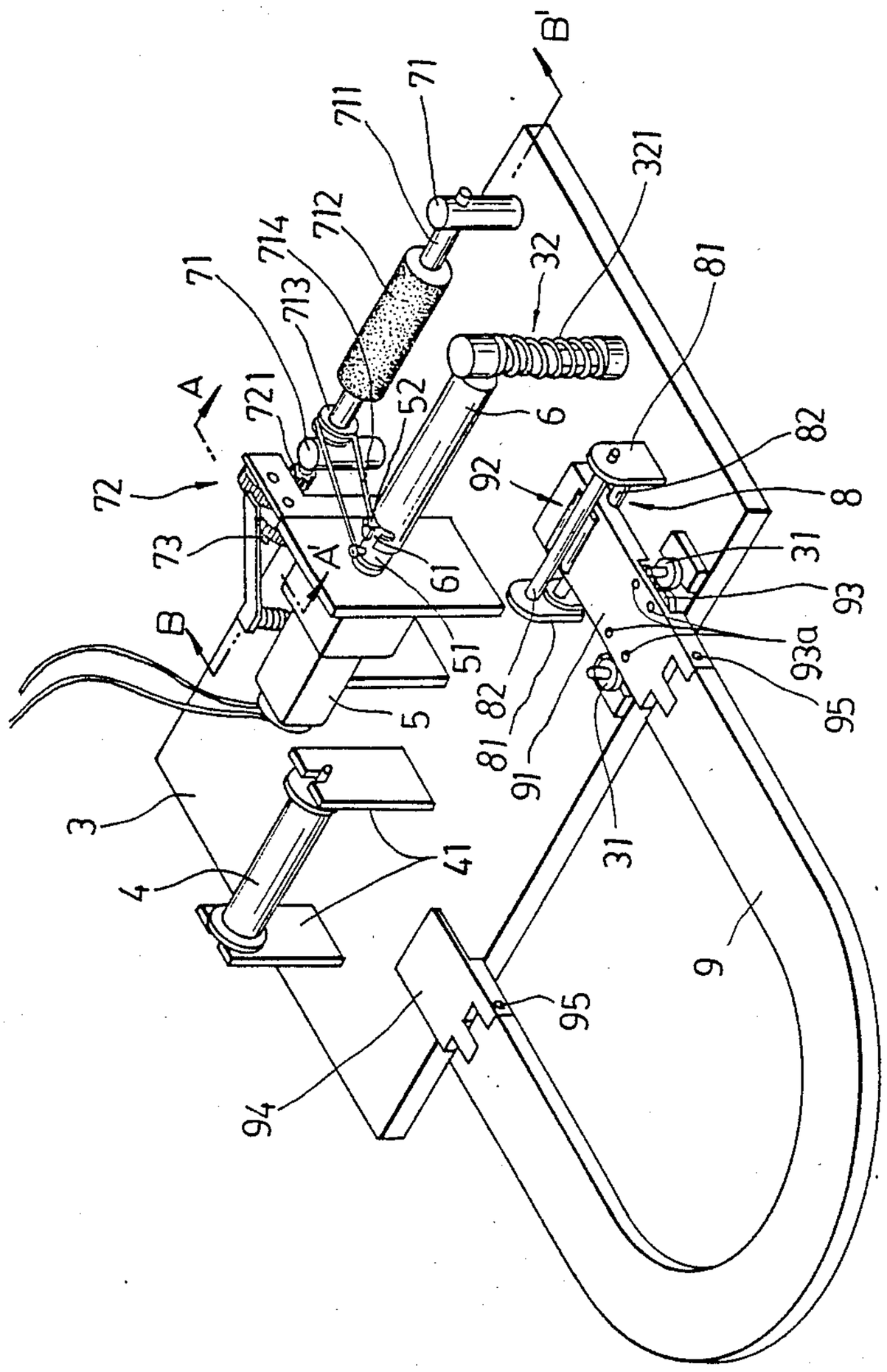


FIG. 1
PRIOR ART


B'
711
71
321
712
714
32
81
71
713
A
721
52
6
72
92
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8
73
A'
61
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93a
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81 82
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94
95

FIG. 2

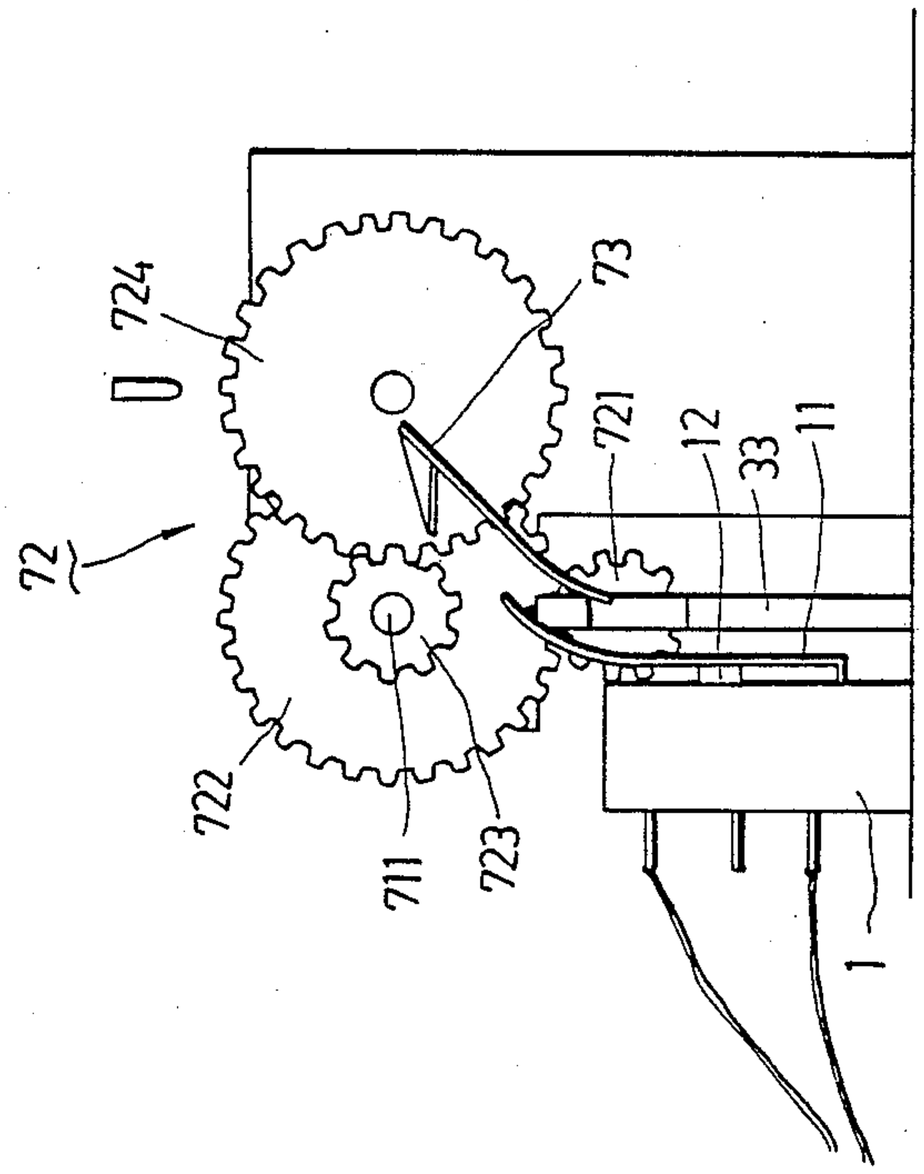

FIG. 4

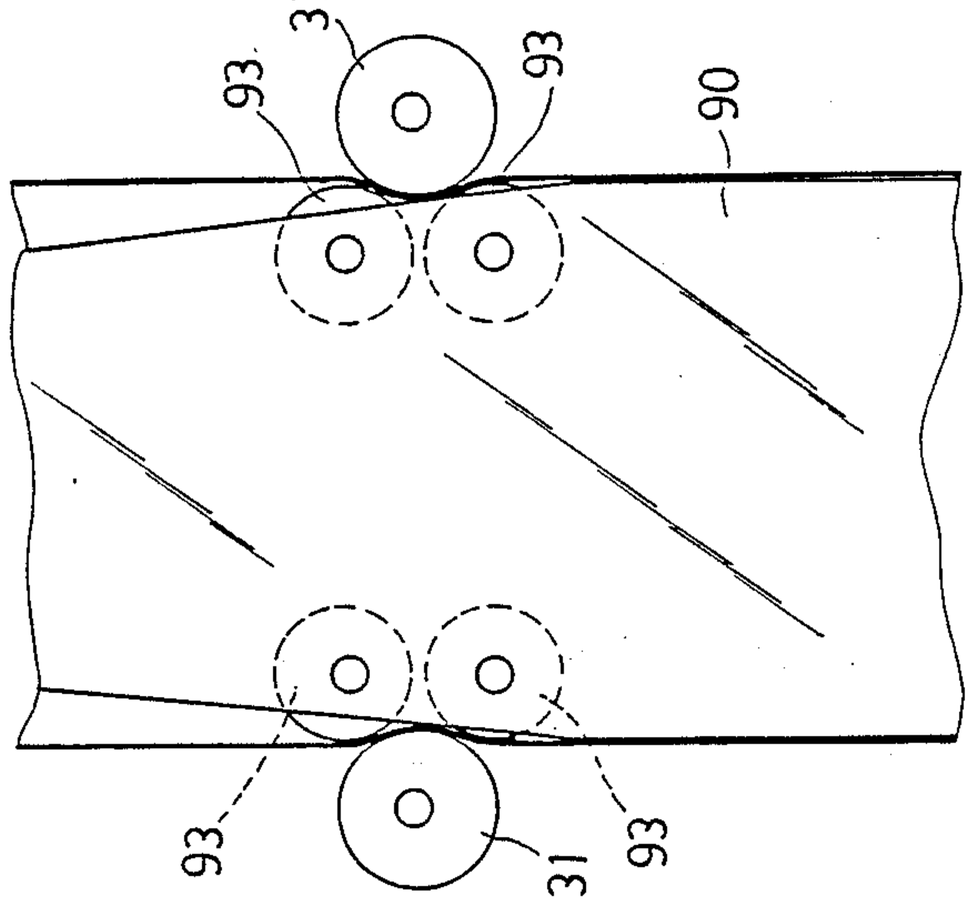

FIG. 3

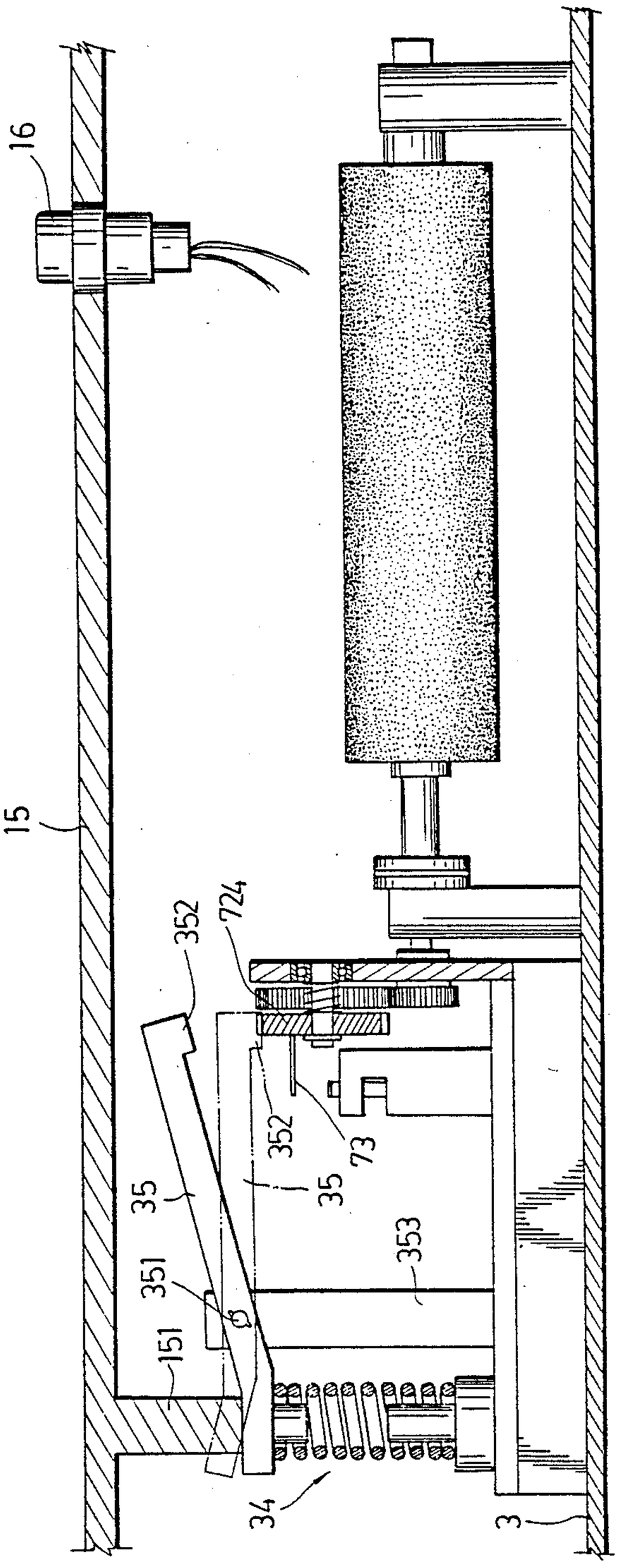

FIG. 5

COMBINED TOILET SEAT AND REELABLE SEAT COVER

BACKGROUND OF THE INVENTION

This invention relates to a tiolet seat and particularly to a combined toilet seat and reelable seat cover.

It is known that the most commonly used toilet seat includes merely a looped seat which is mounted pivotally on a bowl and is bare so that it is in direct contact with every body who occupies it. For sanitation purposes, an improved toilet seat assembly has been developed which includes a flexible cover in the form of a lay-flat tube A to be sleeved on a U-shaped seat plate B through a free end A1 of the seat plate as shown in FIG. 1. The cover can be sleeved on the U-shaped seat plate and a used length of the cover can be reeled up through a motor (not shown) and removed from the seat. Such a device includes a cutting means C for slitting the lay-flat tube into a sheet so that, during winding, the sheet can pass through the end of the seat plate which is secured to a mounting plate D. Since the cutting means C is exposed, in many cases it hurts the person who assembles the device or who loads or unloads the reel of cover tube.

Moreover, the device has a drawback in that the wind-uproller E, which is removably mounted on an output shaft of the motor, is provided with a notch which is liable to disengage from a stud of the output shaft. In some cases, the motor idles since the wind-up roller disengage from the output shaft.

In addition, the reference marks provided on the cover tube for showing the length of the cover being used can not effectively show the real length of the used cover tube since the position of the marks may vary due to the fact that the lengths of the cover unreeled by different persons may be different. Sometimes, the used portion of the cover tube may remain on the seat, and sometimes an excess length of the cover tube may be undesirably wound up.

SUMMARY OF THE INVENTION

An object of the invention is to provide a combined toilet seat and reelable seat covering device which is safe and permits the cover tube to be released from a mounted end of the toilet seat without using a cutting means.

Another object of the invention is to provide a combined toilet seat and reelable seat covering device which can remove an accurate used length of the cover tube.

According to the invention, a combined toilet seat and reelable seat covering device comprises: a seat mounting plate; a substantially U-shaped seat having a first end portion mounted on the mounting plate member and extending forwardly from the seat mounting plate and having a free second end extending back to the mounting plate, the first end portion having a top face, a bottom face, and two opposite side faces; a

In one aspect of the invention, the device further comprises means for limiting the length of the sheet cover to be wound up by the wind-up roller, the limiting means including an electric switch to control the operation of the driving means, a friction roller which is mounted on the mounting plate upstream of the wind-up roller for rotation upon being frictioned by the flexible tube cover, a speed reducing gear assembly associated with the friction roller, the gear assembly including

a gear which incorporates a spring plate to act on the switch so as to de-energize it when a predetermined used length of said cover tube is wound up.

The presently preferred embodiment of the invention will be described in detail with reference to the following drawings, in which

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exploded view of the prior art;

FIG. **2** is an exploded view of the combined toilet seat and reelable seat cover device according to the present invention;

FIG. **3** is a schematic view showing how the lay-flat tube passes between rollers;

FIG. **4** is a sectional view taken along line A–A′ of FIG. **2**; and

FIG. **5** is a sectional view taken along line B–B′ of FIG. **2**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. **2** and **5**, a preferred embodiment of the present invention is shown, including a seat mounting plate **3** to be mounted on a toilet bowl. Attached to the seat mounting plate **3** is a seat member which has a U-shaped seat plate **9** connected through pins **95** to an end segment **91** mounted on the mounting plate **3** and a second end segment **94** which rests on the plate **3**. The U-shaped seat plate **9** is turnable relative to the end segments **91** and **94**. The end segment **91** is provided with a recess opening at the bottom side thereof and receiving four rollers **93** which are carried by shafts journalled in end segment **91** at **93**a and another recess receiving four contacting horizontal rollers **92** which are mounted on the end segment **91**. The means for mounting the end segment **94** includes two elastic brackets **81** which are mounted on the mounting seat **3**, upper and lower rotatable horizontal rods **82** mounted on the brackets **81** for holding therebetween the end segment **91**, the rotatable rods **82** rotatably contacting the rollers **92** of the end segment **91**, and two rollers **31** respectively rotatable about two vertical axes on both sides of the end segment **91**, each roller **31** rotatably contacting two rollers **93**. With the rollers **31** and the rotatable rods **82**, the end segment **91** is mounted immovably on the mounting seat **3**.

A reel **4** is mounted removably on two brackets **41** which in turn are mounted on the mounting plate **3**. The reel **4** carries a flexible sheet cover in the form of a lay-flat tube which is adapted to be sleeved on the U-shaped plate **9** through the free end segment **94** of the seat **9**. The flexible sheet cover may be made of a plastic material or paper.

A wind-up sleeve roller **6** is sleeved removably on an output shaft **51** of a motor **5** which is mounted on the mounting seat **3**. The sleeve roller **6** is provided with a notch **61** which is substantially T-shaped to engage releaseably with a stud **52** of the output shaft **51**. The sleeve roller **6** can be detached from the shaft **51** by releasing the stud **52** from the notch **61**. A post **32** is mounted on the mounting plate **3** and loaded with a helical spring **321** which provides a measure of resiliency. The post **32** is provided with a hole (not shown) to receive one end of the sleeve shaft **6**. the end of the sleeve shaft can be inserted in the hole of the post **32** by slightly pushing away the post **32**. The post permits the end of the sleeve shaft **6** to be released from the hole

when it is moved slightly away from the sleeve shaft **6**. The wind-up sleeve roller **6** can wind up the used portion of the flexible sheet cover by the driving of the motor **5**. When the used sheet cover **90** is wound up by the sleeve roller **6**, the used sheet cover will move between the rollers **31** and **93** (see FIG. **3**) and between the rollers **82** and **91**, thereby being released from the end segment **91**.

In order to completely wind up the used length of the cover sheet or an exact length of the cover sheet after the seat has been occupied, a means is provided for stopping the operation of the wind-up roller **6** when a predetermined length of the cover sheet is wound up. This means includes a friction roller **712** mounted on a shaft **711** which in turn is mounted rotatably on two supports **71**. The friction roller **712** can be rotated by the motor **5** through a transmission belt **714** which passes over the roller **713** and the motor shaft **51**. On the other hand, the friction roller **713** can be turned when the cover tube passes over the friction roller **712** and then is wound up by the wind-up sleeve roller **6**. The friction roller **712** can be rotated simultaneously with the sleeve roller **6** by the movement of the tensed cover sheet.

Referring to FIG. **1** in combination with FIG. **4**, a speed reducing gear assembly **72** is operably associated with the shaft **711**. The gear assembly **72** includes a gear **721** which is mounted on one end of the shaft **711**, a gear **722** with a larger diameter mounted adjacent to and engaging the gear **711**, a gear **723** with a smaller diameter mounted coaxially with the gear **722**, and a gear **724** with a larger diameter mounted adjacent to and engaging the gear **723**. The speed of the gear **724** is substantially slower than that of the gear **721** or the shaft **711**. The speed of the gear **724** is arranged in such a manner that it makes one turn as the friction roller **712** and the gear **721** make several predetermined turns so as to completely reel up the used length of the cover sheet from the seat **9**.

A stop spring plate **73** is attached to the gear **724**. An upright partition plate **33** is provided adjacent to the gear **724**, and a microswitch **1** is installed at the other side of the partition plate **33**. The microswitch **1** is provided with a control member **12** connected to an actuating plate **11** which is adjacent to the partition plate **33** and has a free end extending over the top of the partition plate **33**. When the gear **724** rotates one turn, the stop spring plate **73**, which moves together with the gear **724**, will extend into the opening **331** of the partition plate **33** one time. After the spring plate **73** extends into the opening **331**, it moves upward, then is released from the opening **331** and flex to slide along the partition plate **33** until it passes the top of the partition plate **33** and suddenly stretches. When the spring plate **73** suddenly stretches, it strikes the actuating plate **11**, stopping the motor operation.

Referring to FIG. **5**, a cover **15** is provided on the mounting plate **3**, and a means is provided for immobilizing the gear **724** when the mounting plate **3** is uncovered. The means including a spring loaded rod **34** mounted on the mounting plate **3** near the gear **724**. To the top end of the rod **34** is attached an engaging member **35** which is fulcrumed at **351** on a support **353**. The engaging member **35** has detent projection **352** which can be caused to engage the gear **724** to prevent the gear from moving when the springloaded rod **34** is depressed.

The cover **15** of the mounting plate is provided with a depressing member **151** which depresses the rod **34** when the cover **15** is disposed on the mounting plate **3**. As the rod **34** is depressed, the engaging member **35** turns and moves away from the gear **724**. In this situation, the gear assembly and the friction roller **712** are operative.

A switch **16** is mounted on the cover **15** and connected to the motor so as to be controlled by the user. In operation, the user may depress the switch **16** to actuate the motor **5** so that the sheet cover is wound up. When the engaging member **73** actuates the micro switch **1**, the motor stops its operation and the used predetermined length of the sheet cover is reeled upand thereby removed from the seat **9**.

It can be appreciated that the reel **4** of plastic sheet cover can be mounted on the mounting plate by removing the cover **15** and putting the two ends of the reel **4** in two notches of the brackets **41**. In assembly, the sheet cover is unreeled, then sleeved on the end segment **94** of the U-shaped seat **9**, and drawn to the other end segment **91**. The end segment **91** is placed between the rollers **31** and placed on the lower horizontal roller **82**. Then, the upper horizontal roller **82** is attached to the brackets **81** by pushing the elastic brackets **81** away from one another and releasing them, thereby clamping the end segment **91** with the rollers **92** being contacted with the rollers **82**. From the end segment **91**, the sheet cover is drawn to pass over the friction roller **712**, and then fixed to and wound on the sleeve roller **6**.

When the cover **15** is closed and the switch **16** is depressed, the motor **5** rotates the sleeve roller **6**, thereby reeling the sheet cover from the U-shaped seat **9**. As the sheet cover is reeled, the friction roller **712** as well as the gear assembly is caused to rotate due to the movement of the tensed sheet cover on the friction roller. When the spring plate **73** of the control gear **724** turns to the partition plate and strikes the actuating plate **11** of the switch **1**, the motor stops the reeling operation and the used length of the sheet cover is removed completely from the toilet seat.

The belt transmission mechanism operates only when no tension exists in the sheet cover, that is to say, when the sheet cover is removed from the reel **4** but still has a length to be wound up by the sleeve roller **6**. The belt **714** of the belt transmission mechanism is narrow and arranged such that the driving friction force induced thereby is smaller than that which can be induced by the friction roller **712**. Accordingly, the belt transmission mechanism idles when the friction roller is rotated by the frictioning sheet cover and will operate only when the sheet cover is not tensed and no friction force is present on the friction roller **6**. The belt transmission mechanism can rotate the friction roller **6** and cause the control gear **724** and the control spring **73** to operate.

With the invention thus explained, it is apparent that various modifications and variations can be made without departing from the scope of the invention. It is therefore intended that the invention be limited only as indicated in the appended claims.

What I claim is:

1. A combined toilet seat and reelable seat covering device comprising:

a seat mounting plate;

a substantially U-shaped seat having a first end portion mounted on said mounting plate member, said U-shaped seat extending forward from said seat mounting plate and having a free second end ex-

tending back to said mounting plate, said first end portion having a top face, a bottom face, and two opposite side faces;

a reel rotatably mounted on said seat mounting plate adjacent to said free second end and adapted to carry a flexible lay-flat cover tube;

means for mounting said first end on said seat mounting plate, said means including a support for holding said first end portion at a level above said mounting plate, said support incorporating roller means at said top and bottom faces, and said side faces of said first end portion for clamping therebetween said first end portion and allowing the flexible cover tube to pass therebetween;

a wind-up roller;

a drive means for driving said wind-up roller; and

means for mounting said wind-up roller on said seat mounting plate adjacent to said first end.

2. A combined toilet seat and reelable seat covering device comprising:

a seat mounting plate;

a substantially U-shaped seat having a first end portion mounted on said mounting plate member, said Ushaped seat extending forwardly from said seat mounting plate and having a free second end extending back to said mounting plate;

a reel rotatably mounted on said seat mounting plate adjacent to said free second end;

means for mounting said first end on said seat mounting plate, said means including a support which incorporates roller means for clamping therebetween said first end portion at a level above said mounting plate;

a flexible lay-flat tube cover wound on said reel, said flexible tube cover capable of being sleeved on said U-shaped seat through said free second end and passing between said roller means at said first end portion;

a wind-up roller;

a drive means for driving said wind-up roller; and

means for mounting said wind-up roller on said seat mounting plate adjacent to said first end.

3. A combined toilet seat and reelable seat covering device as claimed in claim **2**, in which said first end portion of said U-shaped seat includes a top face, a bottom face, two opposite side faces, a first cavity opening at said top and bottom face, and a second cavity horizontally spaced apart from said first cavity and being open at said bottom face and at both said side faces, wherein said support of said means for mounting said first end portion includes two brackets vertically extending from said seat mounting plate on two sides of said first end portion near said first cavity, said roller means including first rollers which are rotatable about a horizontal axis and which include first interior rollers attached to said first end portion in said first cavity, and first exterior rollers mounted on said bracktrs adjacent to said top and bottom faces, said first interior rollers and said first exterior rollers contacting each other, said roller means further including second rollers which are rotatable about vertical axes and includes second interior rollers attached to said first end portion in said second cavity and second exterior rollers mounted on said mounting plate adjacent to both said side faces and contacting said second interior rollers.

4. A combined toilet seat and reelable seat covering device as claimed in claim **2**, in which said drive means has a rotary output shaft, and said wind-up roller is a sleeve roller which has one end sleeved around said output shaft, said shaft having an end with a radially extending pin thereon, said one end of said sleeve roller having a substantially T-shaped notch so as to engage releaseably said pin of said output shaft.

5. A combined toilet seat and reelable seat covering device as claimed in claim **4**, wherein said means for mounting said wind-up roller includes a vertical post mounted on said mounting plate and a helical spring loaded thereon to provide a measure of resiliency, said vertical post having a slot to permit another end of said sleeve roller to be inserted into said slot.

6. A combined toilet seat and a reelable seat covering device as claimed in claim **2**, wherein said U-shaped seat includes first and second hinged end segments to define said first and second end portions.

7. A combined toilet seat and a reelable seat covering device as claimed in claim **2**, further comprising means for limiting the length of the sheet cover to be wound up by said wind-up roller, said limiting means including an electric switch to control the operation of said driving means, a friction roller which is mounted on said mounting plate upstream of said wind-up roller for rotation upon being frictioned by said flexible tube cover, a speed reducing gear assembly associated with said friction roller, said gear assembly including a gear which incorporates a spring plate to act on said switch so as to place it in a de-energized position when a predetermined used length of said cover tube is wound up.

8. A combined toilet seat and reelable seat covering device as claimed in claim **7**, wherein said electric switch has an actuating plate, said limiting means further including an upright partition plate disposed between said spring plate and said actuating plate, said upright partition plate permitting said spring plate to actuate said actuating plate when said gear turns to a predetermined position.

9. A combined toilet seat and reelable seat covering device as claimed in claim **8**, wherein said actuating plate has an end portion extending over a top end of said partition plate, said spring plate striking said end portion of said actuating plate when it turns from a lower position to a higher position.

10. A combined toilet seat and reelable seat covering device as claimed in claim **9**, wherein said partition plate has an opening near said top end of said partition plate, said spring plate entering said opening, then being bent and released from said opening upon upward movement and finally stretching suddenly to strike said actuating plate when moving past said top end.

11. A combined toilet seat and reelable seat covering device as claimed in claim **7**, further comprising a belt drive mechanism for transmitting movement from said output shaft to said shaft of said friction roller, said belt drive mechanism being operative when no friction force is induced on said friction roller.

12. A combined toilet seat and reelable seat covering device as claimed in claim **7**, further comprising means for covering said mounting plate and means for preventing said gear from movement when said covering means is removed, said preventing means having a pawl member to engage with said gear, said covering means having a means for depressing said pawl member to disengage from said gear when said mounting plate is covered.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,847,922

DATED : July 18, 1989

INVENTOR(S) : Iue-Tzung HUNG et al

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page, item [19] should read --Hung et al--

FULL NAME OF THE INVENTORS SHOULD READ AS FOLLOWS:

Iue-Tzung HUNG et al

and NOT

Hung IUE-TZUNG et al

Wen-Cherng JANG

and NOT

Jang WEN-CHERNG

Li-Gung LEE

and NOT

Lee LI-GUNG

Signed and Sealed this

Twenty-fifth Day of June, 1991

Attest:

HARRY F. MANBECK, JR.

Attesting Officer

Commissioner of Patents and Trademarks